Department of Defense
Project Manager - Mobile Electric Power

Spring Technical and Marketing Conference

March 2005

Ms. Kelly Alexander
Deputy Project Manager and Technical Director,
DOD Project Manager – Mobile Electric Power

PEO CS&CSS Portfolio & Organization

Program Executive Officer
BG Patrick O'Reilly

Deputy PEO (Interim)
Ms. Patricia Plotkowski

Force Projection
COL Timothy Goddette

114

Army Watercraft Systems
LTC Philip Schoenig

9

Petroleum & Water Systems
LTC Francisco Espaillat

16

Combat Engineer/ Material Handling Equipment
LTC Carol Solesbee

36

Force Sustainment Systems
LTC Lawrence Silas

51

Tactical Vehicles
COL Robert Groller

82

Heavy Tactical Vehicles
LTC Lisa Kirkpatrick

21

Light Tactical Vehicles
LTC Kevin Peterson

22

Medium Tactical Vehicles
Mr. David Dopp

20

Trailers
LTC John Myers

19

Combat Systems Support
Mr. Bob Szerszynski

92

Small Power Systems (USMC)
LtCol Nate Tabbert

6

Medium Power Systems
LTC John Kelleher

18

8

Large Power Systems (USAF)
Mr. Michael Payne (Act.)

35

Sets, Kits, Outfits & Tools
LTC Jeff Carr

25

LTC Dwayne Morton

PEO CS&CSS DA Systems Coordinators

Natick, MA
Warren, MI
Rock Island, IL
Washington
Fort Belvoir, VA
Huntsville, AL

(#) Number of Systems or Products

Combat Systems Support
Project Management Office

Project Manager

Mr. Bob Szerszynski

Deputy PM Acquisition: **Ms. Kelly Alexander**

Deputy PM Logistics: **Mr. Charles Thompson**

Deputy PM Technology: **Mr. Paul Shively**

Department of Defense
Project Manager
Mobile Electric Power

MISSION

Provide the Army with superior combat systems support materiel to accomplish its Maintenance, Recovery, Test Measurement and Diagnostic Equipment, and Mobile Electric Power missions during peace and war.

VISION

Modernized, Supportable, Expeditionary Ordnance Systems

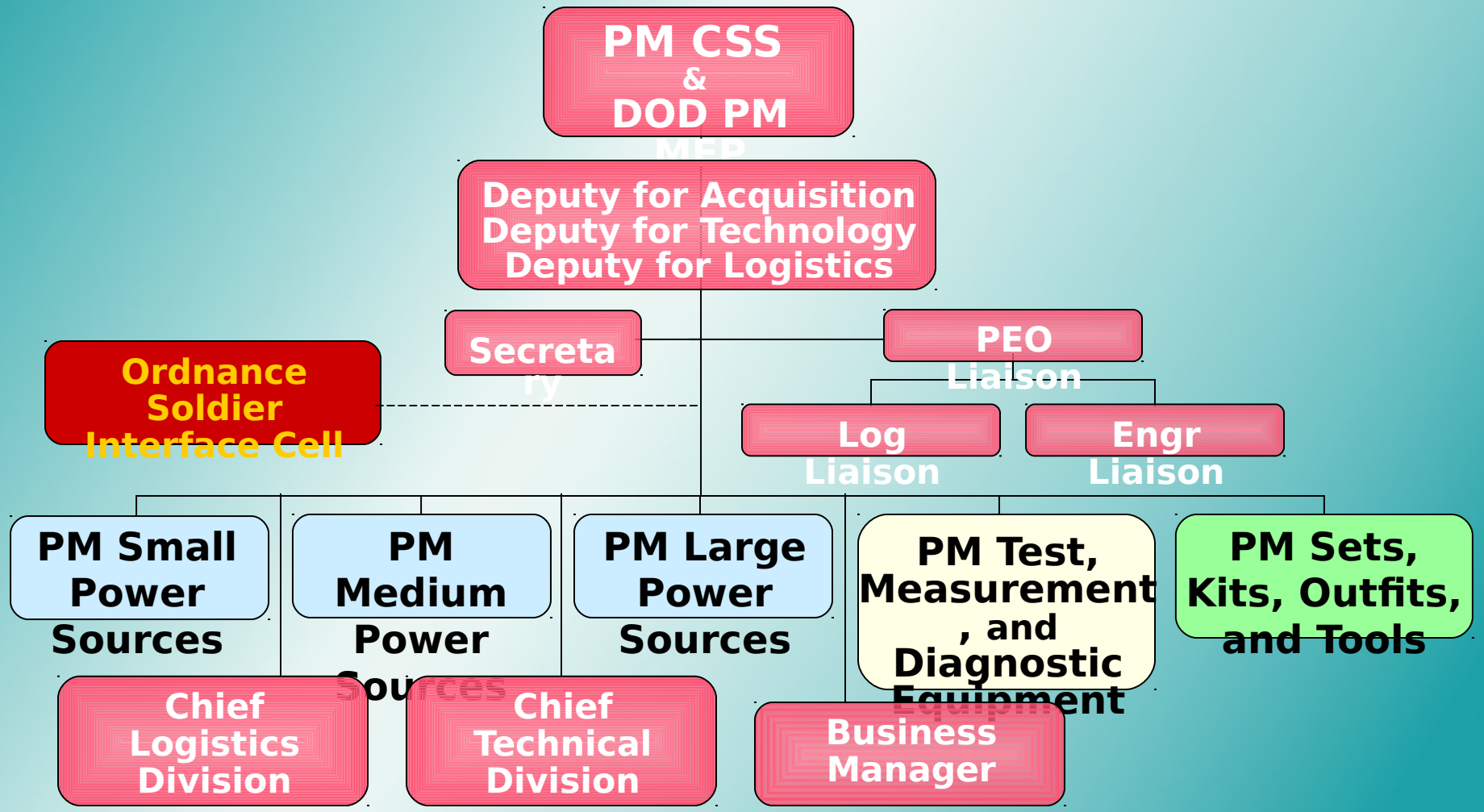
ORDNACE CENTER & SCHOOL

- **System Engineering and Assessment**

PRODUCT MANAGERS

- **Small Power Sources**
  LtCol Nate Tabbert (US Marine Corps)
- **Medium Power Sources**
  LTC John Kelleher Jr.
- **Large Power Sources**
  Vacant (US Air Force)
  Mr. Mike Payne (Acting)
- **Sets, Kits, Outfits, and Tools**
  LTC Jeff Carr (USAR)
- **Test, Measurement, and Diagnostic Equipment**
  LTC Dwayne Morton

PM CSS Organization



92 Programs

Combat Systems Support Products

PM Test, Measurement, and Diagnostic Equipment (TMDE)

Common Embedded Diagnostics — 25 Systems
- **Aviation Digital Source Collector (DSC) Health and Usage Monitoring System (HUMS)**
- **Surface HUMS (SHUMS)**

Calibration Sets (CALSETS)
- **CALSET 2000**
- **CALSETS Equipment Modernization**

IFTE At Platform Automatic Test Systems
- **Maintenance Support Device (MSD) MSD V2**
- **Internal Combustion (ICE) Engine Diagnostic Kit**

IFTE Off Platform Automatic Test Systems
- **Base Shop Test Facility (BSTF) (V) 5**
- **Next Generation Automatic Test System (NGATS) (V) 6**

General Purpose Electronic Test Equipment (GPETE)
- **OS-303, Oscilloscope**
- **AN/USM-677, Spectrum Analyzer**
- **TS-4530/UPM, Portable Radar Test Set**
- **Test Set, Radio A**
- **Test Set, Radio B**
- **Signal Generator 2GHZ**
- **Signal Generator 26.5GHZ**
- **Function Generator**
- **Pulse Generator**
- **Analyzer, Data Communications**
- **Counter, Microwave Frequency**
- **Test Set, Transmission**
- **Oscilloscope, Low End**
- **Analyzer, Distortion**
- **Test Set, Electrical Cable**
- **Test Set, Pitot-static**

DoD PM Mobile Electric Power (MEP)

PM Small Sets — 6 Systems
- **2kW Military Tactical Generator (MTG)**
- **3kW Military Standard Generator (MIL-STD)**
- **3kW Tactical Quiet Generator (TQG)**
- **Small Tactical Electric Power (STEP)**
- **5kW Auxiliary Power Unit (APU)**
- **10kW Auxiliary Power Unit (APU)**

PM Medium Sets — 18 Systems
- **Military Standard Generator (MIL-STD) 5kW, 10kW, 15kW, 30kW, and 60kW**
- **Tactical Quiet Generator (TQG) 5kW, 10kW, 15kW, 30kW, and 60kW**
- **Advanced Medium Mobile Power Sources (AMMPS) 5kW, 10kW, 15kW, 30kW, and 60kW**
- **Power Units / Power Plants (PU/PP)**
- **Power Distribution Illumination System Electrical (PDISE)**
- **Power Management Distribution System (PMDS)**

PM Large Sets — 8 Systems
- **Military Standard Generator (MIL-STD) 100kW, 200kW, 500kW, 750kW**
- **Tactical Quiet Generator (TQG) 100kW and 200kW**
- **Deployable Power Generation and Distribution System (DPGDS)**
- **Large Advanced Mobile Power Sources (LAMPS)**

PM Sets, Kits, Outfits and Tools (SKOT)

Diving Equipment — 35 Systems
- **Diving Equipment Sets (A and B)**
- **Recompression Chamber**
- **Under Water Photo Support Set**

Explosive Ordnance Disposal Equipment
- **Remote Ordnance Neutralization System (RONS)**
- **Remote Activation Munition System (RAMS) MK 152**
- **Small Caliber Dearmer (SCD) MK 38 Mod 0**

Sets, Kits & Outfits
- **Automotive Maint and Repair, FM Basic & Supplement**
- **General Mechanic's Tool Kit (GMTK)**
- **Individual Repairman Aircraft Armament Tool Set (NATS-A)**
- **Shop Equipment Mechanical Maintenance, Shelter**
- **Small Arms Toolkit**
- **Standard Automotive Tool Set (SATS)**

Shelter Mounted Sets, Kits, and Outfits
- **Body, Explosive Ordnance Disposal (BEOD)**
- **Engine Fuel System Repair, Shelter**
- **Mtd /Electronic System Maint, Weapon Tool Kit**
- **Instrument & Fire Control Repair, Shelter Mounted**
- **Mechanical Maintenance, Shelter Mounted /Battalion Maintenance Sets**
- **Power Plant Set, Shelter Mounted**
- **Small Arms Repairs, Shelter Mounted**
- **Tool Set Contact & Emergency Repair**
- **Tool Set, Full Tracked Vehicle Repair**

Shop Set Equipment
- **Forward Repair System (FRS)**
- **Hydraulic System Test and Repair Unit (HSTRU)**
- **Pioneer Tool Outfit (PTO)/Hydraulic and Electric Tool Outfit (HETO)**
- **Shop Equipment, Contact Maintenance (SECM)**
- **Shop Equipment General Purpose (GP) Repair**
- **Shop Equipment Organizational (ORG)Repair**

DOD Project Manager Mobile Electric Power

Mission

Provide a Modernized **Department of Defense Standard Family** of **Mobile Electric Power** Generating Sources for **All Services** For Maximum DOD Component Use. Accomplish this Mission Through a Coordinated Inter-Service Effort to Develop, Acquire, and Support Mobile Electric Power Sources from Small, 0.5kW Manportable Generators to Large, 920kW and Greater Prime Power Systems.

Support for the Soldier, Sailor, Airman, Marine

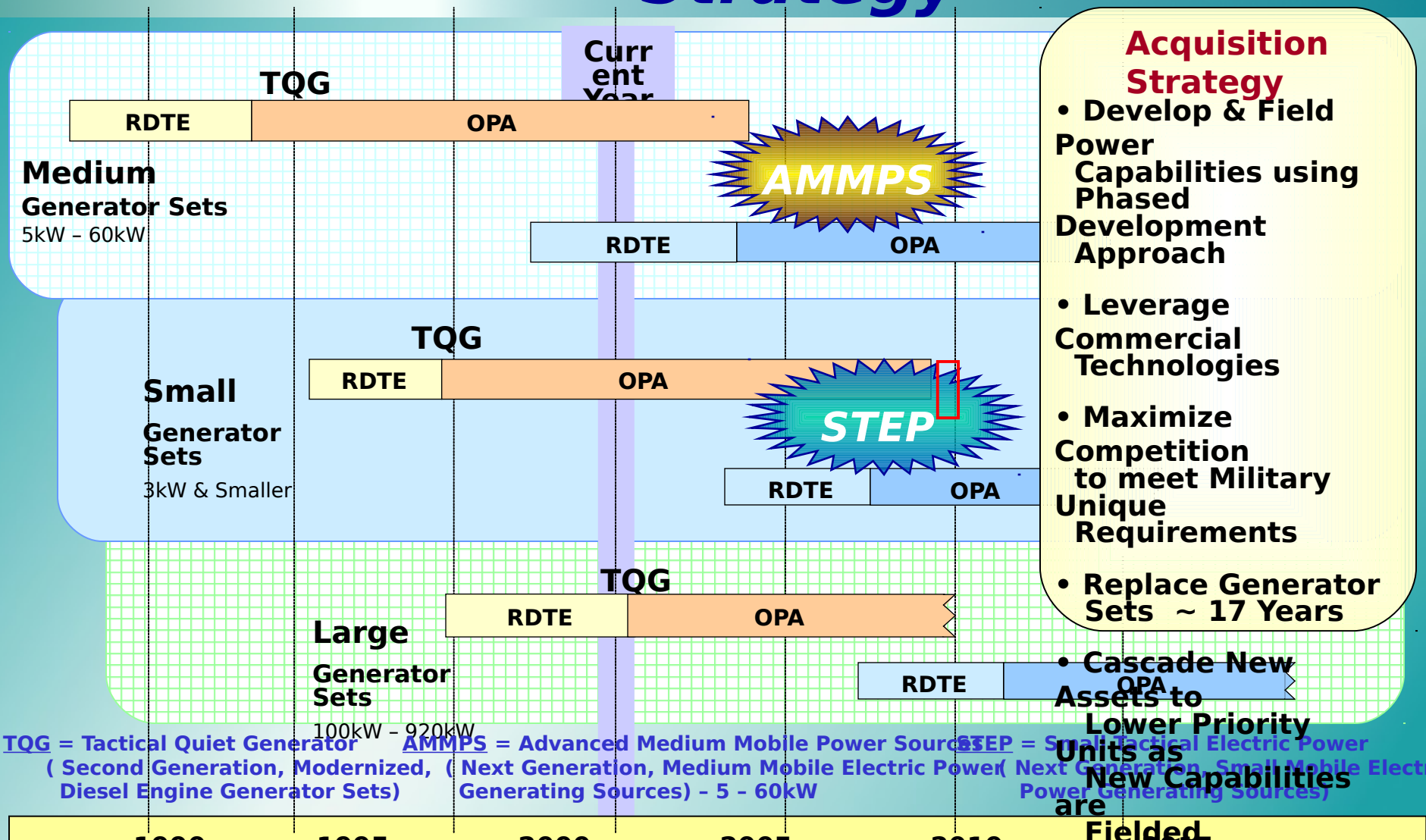
" First to Generate Combat Power "

Ref: DODD 4120.11

Mobile Electric Power – Essential To Warfighting

Electric Power Provided to All Services Across the Total Spectrum of Military Operations

Power Source Modernization Strategy



Acquisition Strategy

- Develop & Field Power Capabilities using Phased Development Approach
- Leverage Commercial Technologies
- Maximize Competition to meet Military Unique Requirements
- Replace Generator Sets ~ 17 Years
- Cascade New Assets to Lower Priority Units as New Capabilities are Fielded

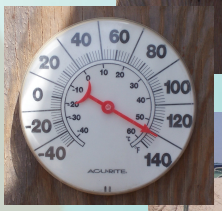
TQG = Tactical Quiet Generator (Second Generation, Modernized, Diesel Engine Generator Sets)

AMMPS = Advanced Medium Mobile Power Sources (Next Generation, Medium Mobile Electric Power Generating Sources) – 5 – 60kW

STEP = Small Tactical Electric Power (Next Generation, Small Mobile Electric Power Generating Sources)

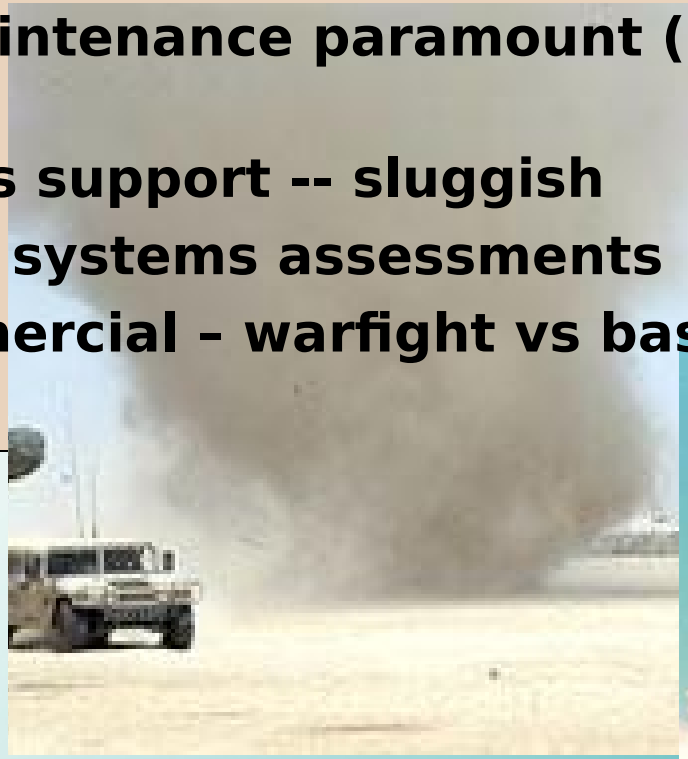
First Opportunity for Fuel

Harsh Environmental



Iraq/Afghanistan Lessons Learned

- Power distribution – training/equipment/procedures
- High temperature operation critical
- Sand/dust impacts
- Solar loading (especially on displays)
- Preventative maintenance paramount (but not being done)
- Inadequate parts support -- sluggish
- Requirement for systems assessments
- Military vs commercial – warfight vs base operations



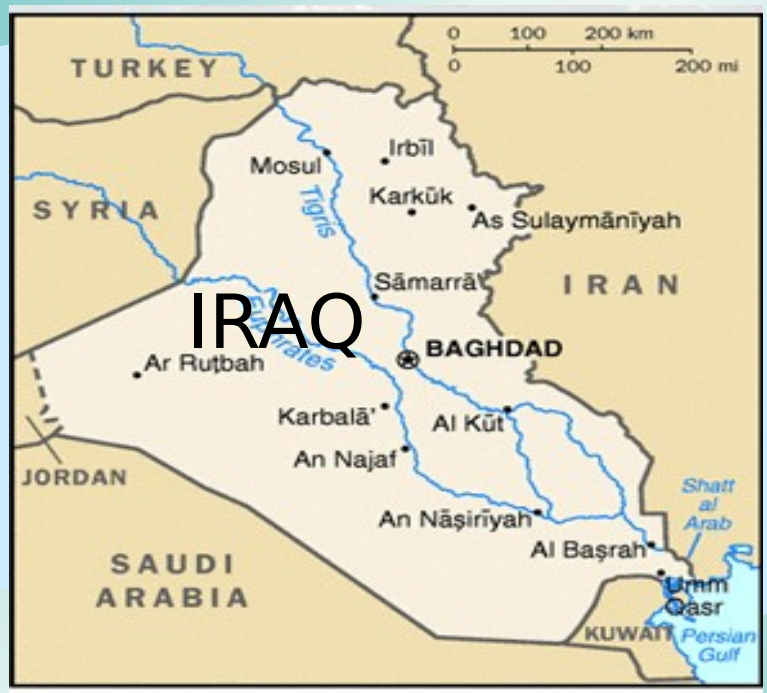
Project Manager Combat Systems Support

OIF Operation Iraqi Freedom

Observations

OIF

Operation Iraqi Freedom



Observations

Product Manager Test, Measurement, and Diagnostic Equipment PM TMDE

Department of Defense Project Manager Mobile Electric Power PM MEP

Product Manager Small Power Sources
Product Manager Medium Power Sources
Product Manager Large Power Sources

Product Manager Sets, Kits, Outfits, and Tools PM SKOT

Impact of Environment on CSS Equipment

OIF Operation Iraqi Freedom

Observations

Issue: Temperatures in excess of 140 degree Fahrenheit and extreme dust conditions caused equipment failures that ultimately led to a lack of replacement parts.

TQG Master Switch Issue

Resolution:

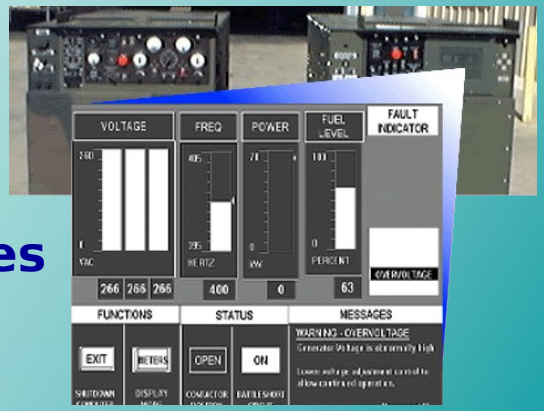
- **Through CECOM LARs – Distributed Detailed Instructions to Temporarily Bypass Master Switch to Operate Generator Set**
- **Worked With Master Switch Manufacturer – Developed and Distributed Dust Cover Kits and Distributed through LARs**
- **Developed a Dust Proof Replacement Switch that was Form, Fit, and Functionally Interchangeable with the Original Switch**

TQG Computer Interface Modules (CIM) Failures

Resolution:

- **Screen Overheating Resolved by Proper Operating Techniques – Generator Set Sighting and Closing of Control Panel Cover**
- **Contrast Misadjustment Resolved by Development and Distribution of CIM Specific Diagnostics Procedure and Issue of Adjustment Tool**

Analog Digital



CIM

Power Distribution

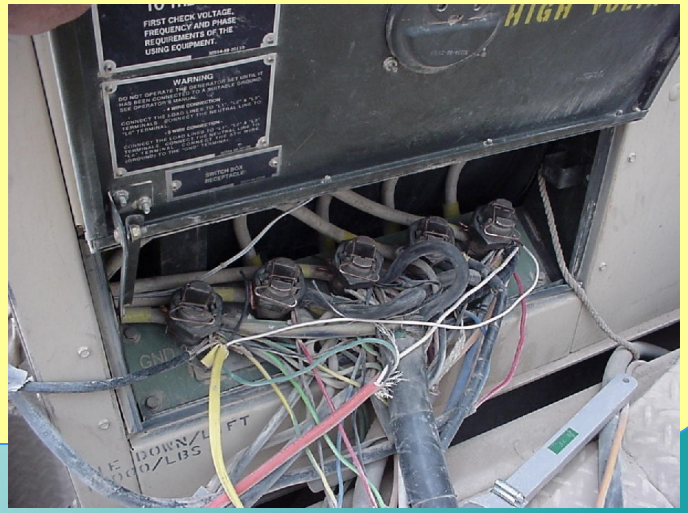
OIF Operation Iraqi Freedom

Observations

Issue: Insufficient Power distribution equipment resulted in Units using Improper Wiring (Major Safety Issue as Shown)

Resolution:

- **Distributed (through LARs) Information Sheet Delineating Proper Wire Sizes and Wiring Techniques**
- **Currently conducting market survey for commercially available power distribution equipment to fulfill field shortages.**



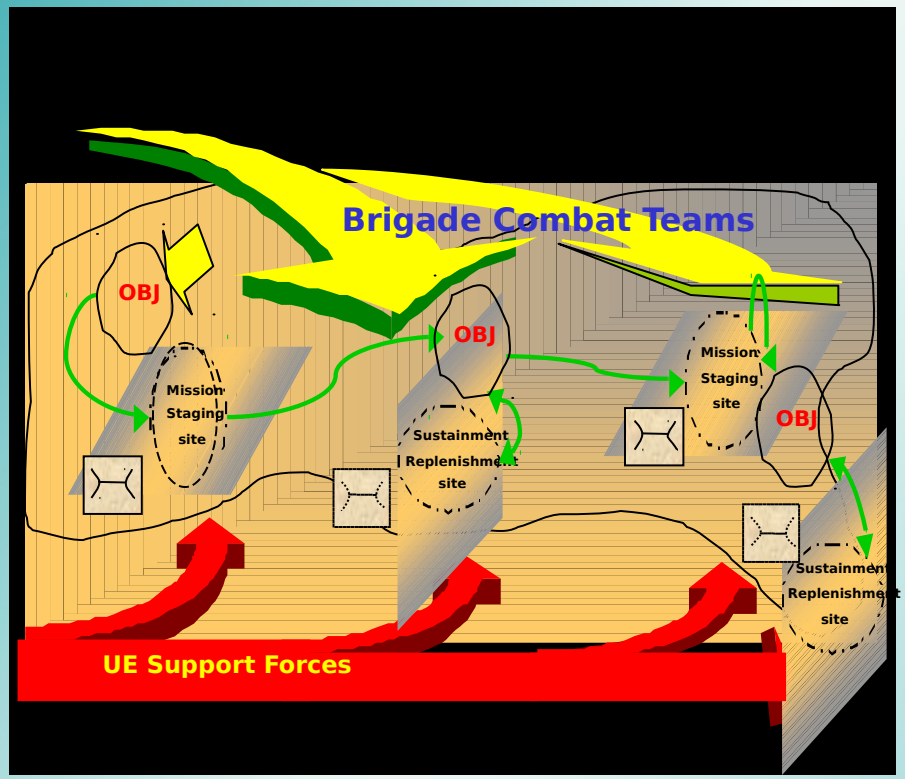
DoD PM Mobile Electric Power

	New Capability/Accomplishment	Program Update
	**100/200 kW Tactical Quiet Generator Set:** The 100kW and 200kW Tactical Quiet Generators (TQG) will replace the current 100kW and 200kW Military Standard (MIL STD) generators. Improvements include less weight, diesel/JP-8 fueled, reduced aural signature, improved reliability, and decreased operational/maintenance costs.	IETM verification and validation ongoing. Congressional FY05 add of $1M for additional production to support urgent need for Combat Support Hospital (CSH) in Iraq. PM CSS working with PM on conducting a power assessment of CSH to further define need.
	**Advanced Medium Mobile Power Sources (AMMPS):** DOD-wide (joint) acquisition program to modernize Military Standard (MIL-STD) and Tactical Quiet Generators (TQG).. Required characteristics for these future power sources include increased fuel efficiency, reduced acoustic/infrared signatures; increased reliability; diagnostics & prognostics. •Initiative: Reduced Test Plan to 3 Months. Incentivising Ktr's for accelerated delivery for Phase II deliverables.	Two R&D contracts awarded Sep 04. KTRs competing for down select to one KTR for DT/OT and production contract. Recent resolution of a protest has allowed program to begin prototype development. Start of work meetings are scheduled for mid Feb 05. AMMPS scheduled to begin fielding in FY09.
	**Power Management Distribution System (PMDS):** PMDS will allow units to manage their power better by prioritizing the loads connected to the distribution system; disconnect and connect the loads based on their priority and the amount of power available. PMDS will operate in the same environments as the TEP systems.	CECOM conducting a market survey of commercially available power distribution equipment. The intent is to field an intelligent power management/distribution system simultaneous with AMMPS.
	**Small Tactical Electrical Power (STEP):** Future replacement for the 2kW MTG & 3 kW TQG. Technologies being evaluated include high speed diesels, Stirling engines, and fuel cells.	CECOM evaluating commercially available and state-of-the-art components and systems that offer lightweight, reliable power. Being evaluated against the current TEP ORD. An Industry Day is planned for Oct 2005
	**Power Assessments** Program to Assess and Optimize the use of Tactical Electric Power Production and Distribution in the Field to Maintainability, and Readiness, Reduce Fu	Recent Power assessments include the V CORPS and the Combat ed sle Defense

"Connect" our Logisticians | Improve Force Reception
Modernize Theater Distributio | Integrate the Supply Chain

Army Tactical Electric Power (TEP)

Electricity for all units in the battlespace
from better power sources….



New Requirements:

- **Increased fuel economy.**
- **Reduced support costs.**
- **Increased reliability.**
- **Repair via module replacement.**
- **Prognostics/Diagnostics.**
- **Reduced system weight.**
- **Reduced logistics needs.**

Small Tactical Electric Power (STEP)

Stirling Engine

Technical/Performance

Power Output	**0.5kW – 3.0kW**
Hot & Basic Climate	**-50ºF to +135ºF**
Altitude Performance	**Full rating @ 4,000ft, 95ºF**
	Operate up to 10,000 ft @ 95ºF
Weight	**142-293 lbs**
Fuel Consumption	**0.24-0.28 gph**
Fuel	**Diesel/JP-8**
Noise	**67- 72 dBA @ 7m (Silent Watch Capability)**
Frequency	**50/60/400 Hz/ DC ?**
Reliability MTBEFF	**750-1,250 hours**

Microturbine

Time F

Objectives 2005

- **Conduct Paper Study for Militarization of Stirling and Microturbine Technology**
- **Continue Testing of Procured Systems and Developed Power Electronics Module**

Industry Day ~ Sep/Oct 05

Program Schedule Goals

- **2006 – Release Draft Specification.**
- **2007 – Release Solicitation**

Power System Assessment

What it is

Program to Assess and Optimize the use of Tactical Electrical Power Production and Distribution in the Field

- Improve Reliability, Maintainability & Readiness
- Reduce Fuel Consumption
- Improve Transportability

Close Combat Tactical Trainer

V CORPS TAC CP - Grafenwoehr

"Right Number and Right Size Generator Sets"

Power Assessments Conducted by CECOM Power Generation Division for PM MEP

Power Assessments Completed

3rd Brigade/2nd ID, Ft Lewis, WA
(Stryker Brigade Combat Team – SBCT)

1st CAV DIV, Fort Hood, TX

XVIII Airborne Corps, Fort Bragg, NC

US Army V CORPS, Germany

Combat Developer for Ordnance,
Fort Lee, VA

Force Management Division, G8,
US Army Special Operations

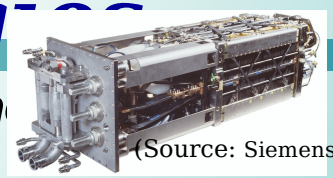
Power Assessments Scheduled

Ground Based Midcourse Defense Program, Ballistic Missile Defense System Test Bed, Fort Greely, AK

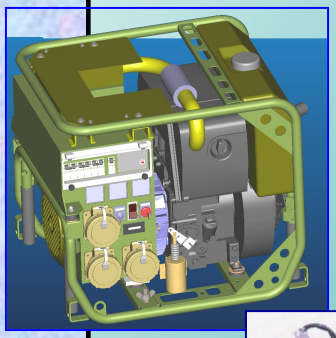
UEx Command Posts (TF Modularity)

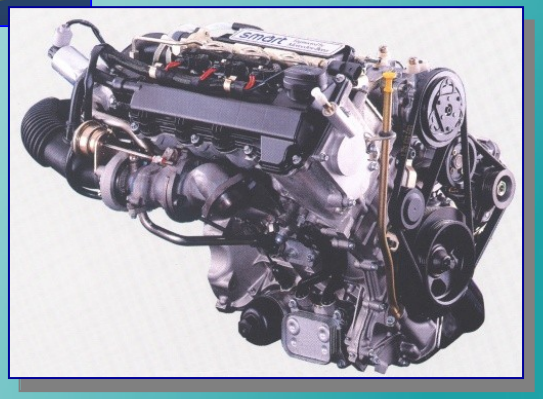
Potential Advanced Technologies

- Advanced High Speed Diesel Engin
- Direct Fuel Injection
- Permanent Magnet Alternator
- Power Electronics & Digital Cont
- Composite Materials & Light Allo
- Diagnostic & Prognostic Controls
- Microturbines
- Stirling Engines
- Direct Energy Conversion
  - Thermophotovoltaics
  - Fuel Cells
- Tactical Inverter (Vehicle & Shelter)



(Source: Siemens)





Technologies Must Satisfy Operational Needs

On-going R & D Efforts

Previous STO IV.LG.2003.01

- High Speed Diesel Engine (Yanmar Vertical Shaft)
  - Permanent Magnet Alternator
  - Advanced Composits and Digital Controls
  - High-Temperature Devices and Circuits for Variable Frequency AC/AC Power Conversion

CERDEC ATO IV.LG.2005.02 Future Force Power and TARDEC ATO Fuel Cell Development for Military Vehicles feeds:

Small Tactical Electric Power (STEP)

Military need for ***man- portable*** power in the 500 to 3000 W range with periodic ***silent operating capability.***

***Technology Areas of Interest*:**

- **Stirling Power Systems**
- **Fuel Cell Power Systems**
- **Tactical Inverter**
- **Microturbine**

< 1 kW Stirling Engine Driven System

2 kW JP-8 Microturbine System

Power Source developed above also feeds:

Cogeneration Power and Cooling

2 to 3 kW Electric Power-
12 to 18 kBTUh Cooling

- **Silent Operation**
- **Cooling**
- **Exportable Power**
- **50% Reduced Fuel Consumption**
- **Ozone Friendly**

Integrated Co-generation system, recoverable heat from power source used for system environmental control.

Summary

In Production

1. 2 kW MTG– Dewey Electronics
2. 3 kW TQG– ESSI Fermont
3. 5/10/15 kW TQG – ESSI Fermont
4. 30/60 kW TQG– L3 Communication
5. 100/200 kW TQG – ESSI Fermont

Future

- *STEP Industry Day Sep/Oct 05*
- *STEP Draft Technical Parameter (End of 06)*
- *STEP Solicitation (Summer of 07)*
- *AMMPS Rebuy ~ 08/09*
- *PMDS – Spec Available ~ Oct 05*

Ongoing Projects

- **RESET – Repair/Recap/Replace (CECOM Ft. Monmouth)**
- **AMMPS – Phase I R&D (Fermont, Onan)**
- **STEP – In House Tech Eval (CECOM Ft. Belvoir)**
- **PDMS – PWR Distribution Market Research/Test (CECOM , Ft Belvoir)**
- **Integrated APU/ECU – (CECOM Ft. Belvoir)**
- **UHP – Marine Corps → Down Select complete – Testing**
- **HE – HMMWV→ P&E IPT**

Closing Comments

"We need equipment that is easy to maintain, and doesn't break down. If it does break down, we can fix it without ANY tools."

PM CSS

Questions ???

PM-MEP *Home Page*

- DoD Directive 4120.11
- TQG Technical Data
- "What's New"
- Safety of Use Messages
- Organization and Points of Contact
- DoD Generator Master Pl
- Manuals, Tools, PLL/A
- PS Magazine Articles
- References
  (i.e. MIL STDs, ARs, etc.)

MORE !

www.pm-mep.army.mil

Comments / Recommendations Solicited

Information / Points of Contact

Phones

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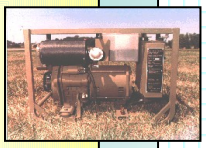

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